Apprenticeship and Industry Training

Roofer

Apprenticeship Course Outline

2812 (2012)

Alberta

Apprenticeship and Industry Training

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Apprenticeship

Apprenticeship is post-secondary education with a difference. Apprenticeship begins with finding an employer. Employers hire apprentices, pay their wages and provide on-the-job training and work experience. Approximately 80 per cent of an apprentice's time is spent on the job under the supervision of a certified journeyperson or qualified tradesperson. The other 20 per cent involves technical training provided at, or through, a post-secondary institution – usually a college or technical institute.

To become certified journeypersons, apprentices must learn theory and skills, and they must pass examinations. Requirements for certification—including the content and delivery of technical training—are developed and updated by the Alberta Apprenticeship and Industry Training Board on the recommendation of Roofer Provincial Apprenticeship Committee.

The graduate of the Roofer apprenticeship program is a certified journeyperson who will be able to:

- understand the principles and practices of roofing
- know the characteristics and to understand the actions and interactions of roofing materials
- interpret plans and specifications and to layout and develop projects accordingly
- calculate material and quantities
- use hand tools and powered equipment in a proper and safe manner
- relate to the work of other tradesmen in the construction industry
- perform assigned tasks in accordance with quality and production standards required by industry

Apprenticeship and Industry Training System

Industry-Driven

Alberta's apprenticeship and industry training system is an industry-driven system that ensures a highly skilled, internationally competitive workforce in more than 50 designated trades and occupations. This workforce supports the economic progress of Alberta and its competitive role in the global market. Industry (employers and employees) establishes training and certification standards and provides direction to the system through an industry committee network and the Alberta Apprenticeship and Industry Training Board. The Alberta government provides the legislative framework and administrative support for the apprenticeship and industry training system.

Alberta Apprenticeship and Industry Training Board

The Alberta Apprenticeship and Industry Training Board provides a leadership role in developing Alberta's highly skilled and trained workforce. The board's primary responsibility is to establish the standards and requirements for training and certification in programs under the Apprenticeship and Industry Training Act. The board also provides advice to the Minister of Advanced Education on the needs of Alberta's labour market for skilled and trained workers, and the designation of trades and occupations.

The thirteen-member board consists of a chair, eight members representing trades and four members representing other industries. There are equal numbers of employer and employee representatives.

Industry Committee Network

Alberta's apprenticeship and industry training system relies on a network of industry committees, including local and provincial apprenticeship committees in the designated trades, and occupational committees in the designated occupations. The network also includes other committees such as provisional committees that are established before the designation of a new trade or occupation comes into effect. All trade committees are composed of equal numbers of employer and employee representatives. The industry committee network is the foundation of Alberta's apprenticeship and industry training system.

Local Apprenticeship Committees (LAC)

Wherever there is activity in a trade, the board can set up a local apprenticeship committee. The board appoints equal numbers of employee and employer representatives for terms of up to three years. The committee appoints a member as presiding officer. Local apprenticeship committees:

- monitor apprenticeship programs and the progress of apprentices in their trade, at the local level
- make recommendations to their trade's provincial apprenticeship committee (PAC) about apprenticeship and certification in their trade
- promote apprenticeship programs and training and the pursuit of careers in their trade
- make recommendations to the board about the appointment of members to their trade's PAC
- help settle certain kinds of disagreements between apprentices and their employers
- carry out functions assigned by their trade's PAC or the board

Provincial Apprenticeship Committees (PAC)

The board establishes a provincial apprenticeship committee for each trade. It appoints an equal number of employer and employee representatives, and, on the PAC's recommendation, a presiding officer - each for a maximum of two terms of up to three years. Most PACs have nine members but can have as many as twenty-one. Provincial apprenticeship committees:

- Make recommendations to the board about:
    - standards and requirements for training and certification in their trade
    - courses and examinations in their trade
    - apprenticeship and certification
    - designation of trades and occupations
    - regulations and orders under the Apprenticeship and Industry Training Act
- monitor the activities of local apprenticeship committees in their trade
- determine whether training of various kinds is equivalent to training provided in an apprenticeship program in their trade
- promote apprenticeship programs and training and the pursuit of careers in their trade
- consult with other committees under the Apprenticeship and Industry Training Act about apprenticeship programs, training and certification and facilitate cooperation between different trades and occupations
- consult with organizations, associations and people who have an interest in their trade and with employers and employees in their trade
- may participate in resolving certain disagreements between employers and employees
- carry out functions assigned by the board

Roofer PAC Members at the Time of Publication

Mr. G. Bye	Calgary	Presiding Officer
Mr. C. Adam	Edmonton	Employer
Mr. L. McNichol	Calgary	Employer
Mr. P. Murphy	Calgary	Employer
Mr. G. Playsted	Calgary	Employer
Mr. C. Barnicott	Edmonton	Employee
Mr. B. Lamb	Calgary	Employee
Mr. M. Szmaj	Lethbridge	Employee

Alberta Government

Alberta Advanced Education works with industry, employer and employee organizations and technical training providers to:

- facilitate industry's development and maintenance of training and certification standards
- provide registration and counselling services to apprentices and employers
- coordinate technical training in collaboration with training providers
- certify apprentices and others who meet industry standards

Technical Institutes and Colleges

The technical institutes and colleges are key participants in Alberta's apprenticeship and industry training system. They work with the board, industry committees and Alberta Advanced Education to enhance access and responsiveness to industry needs through the delivery of the technical training component of apprenticeship programs. They develop lesson plans from the course outlines established by industry and provide technical training to apprentices.

Apprenticeship Safety

Safe working procedures and conditions, incident/injury prevention, and the preservation of health are of primary importance in apprenticeship programs in Alberta. These responsibilities are shared and require the joint efforts of government, employers, employees, apprentices and the public. Therefore, it is imperative that all parties are aware of circumstances that may lead to injury or harm.

Safe learning experiences and healthy environments can be created by controlling the variables and behaviours that may contribute to or cause an incident or injury. By practicing a safe and healthy attitude, everyone can enjoy the benefit of an incident and injury free environment.

Alberta Apprenticeship and Industry Training Board Safety Policy

The Alberta Apprenticeship and Industry Training Board (board) fully supports safe learning and working environments and emphasizes the importance of safety awareness and education throughout apprenticeship training- in both on-the- job training and technical training. The board also recognizes that safety awareness and education begins on the first day of on-the-job training and thereby is the initial and ongoing responsibility of the employer and the apprentice as required under workplace health and safety training. However the board encourages that safe workplace behaviour is modeled not only during on-the-job training but also during all aspects of technical training, in particular, shop or lab instruction. Therefore the board recognizes that safety awareness and training in apprenticeship technical training reinforces, but does not replace, employer safety training that is required under workplace health and safety legislation.

The board has established a policy with respect to safety awareness and training:

> **The board promotes and supports safe workplaces, which embody a culture of safety for all apprentices, employers and employees. Employer required safety training is the responsibility of the employer and the apprentice, as required under legislation other than the *Apprenticeship and Industry Training Act.***

The board's complete document on its 'Apprenticeship Safety Training Policy' is available at www.tradesecrets.alberta.ca; access the website and conduct a search for 'safety training policy'.

Implementation of the policy includes three common safety learning outcomes and objectives for all trade course outlines. These common learning outcomes ensure that each course outline utilizes common language consistent with workplace health and safety terminology. Under the title of 'Standard Workplace Safety', this first section of each trade course outline enables the delivery of generic safety training; technical training providers will provide trade specific examples related to the content delivery of course outline safety training.

Workplace Health and Safety

A tradesperson is often exposed to more hazards than any other person in the work force and therefore should be familiar with and apply the Occupational Health and Safety Act, Regulations and Code when dealing with personal safety and the special safety rules that apply to all daily tasks.

Workplace Health and Safety (Alberta Employment and Immigration) conducts periodic inspections of workplaces to ensure that safety regulations for industry are being observed.

Additional information is available at www.worksafely.org

Technical Training

Apprenticeship technical training is delivered by the technical institutes and many colleges in the public post-secondary system throughout Alberta. The colleges and institutes are committed to delivering the technical training component of Alberta apprenticeship programs in a safe, efficient and effective manner. All training providers place great emphasis on safe technical practices that complement safe workplace practices and help to develop a skilled, safe workforce.

The following institutions deliver Roofer apprenticeship technical training:

Northern Alberta Institute of Technology

Procedures for Recommending Revisions to the Course Outline

Advanced Education has prepared this course outline in partnership with the Roofer Provincial Apprenticeship Committee.

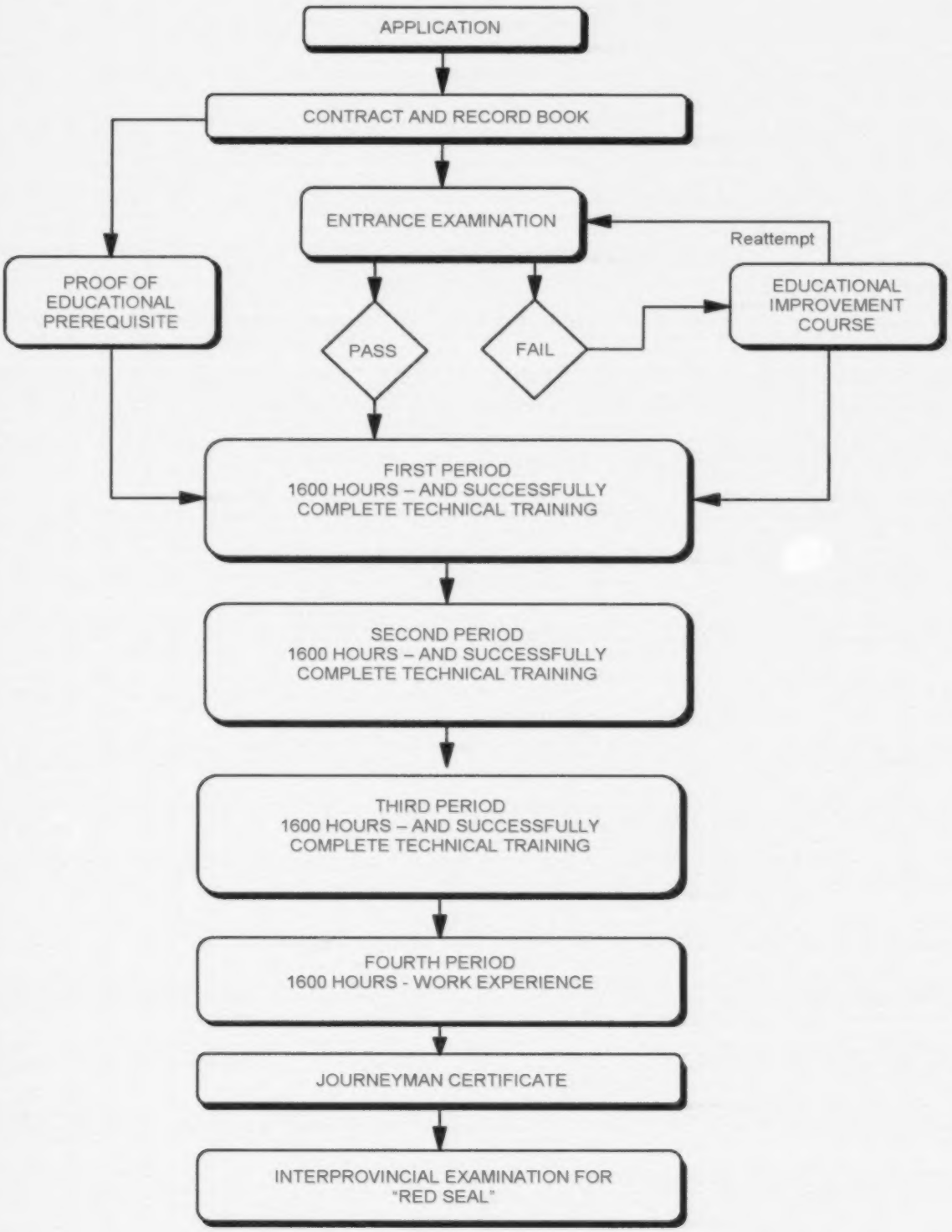
This course outline was approved on November 4, 2011 by the Alberta Apprenticeship and Industry Training Board on a recommendation from the Provincial Apprenticeship Committee. The valuable input provided by representatives of industry and the institutions that provide the technical training is acknowledged.

Any concerned individual or group in the province of Alberta may make recommendations for change by writing to:

Roofer Provincial Apprenticeship Committee
c/o Industry Programs and Standards
Apprenticeship and Industry Training
Advanced Education
10th floor, Commerce Place
10155 102 Street NW
Edmonton AB T5J 4L5

It is requested that recommendations for change refer to specific areas and state references used. Recommendations for change will be placed on the agenda for regular meetings of the Roofer Provincial Apprenticeship Committee.

Apprenticeship Route toward Certification



Roofer Training Profile
FIRST PERIOD
(6 Weeks 30 Hours Per Week – Total of 180 Hours)

SECTION ONE

STANDARD WORKPLACE SAFETY
28 HOURS

A	B	C
Safety Legislation, Regulations & Industry Policy in the Trades 2 Hours	Climbing, Lifting, Rigging and Hoisting 2 Hours	Hazardous Materials & Fire Protection 3 Hours
D	**E**	**F**
Apprenticeship System Orientation 2 Hours	Safe Roofing Practices & Regulations 2 Hours	Commercial / Industrial Roof Structures 4 Hours
G	**H**	**I**
Roof Deck Materials 2 Hours	Roof Deck Loading Procedures 2 Hours	Hand and Power Tools 2 Hours
J	**K**	**L**
Hoisting Equipment for Roofing 3 Hours	Roofing Equipment 2 Hours	Truck Loading Procedures 2 Hours

SECTION TWO

LOW SLOPE ROOFING
60 HOURS

A	B	C
Torch Safety 6 Hours	Kettles and Burners 4 Hours	Modified Bitumen 34 Hours
D		
BUR (Built Up Roofing) 16 Hours		

SECTION THREE

STEEP SLOPE ROOFING
48 HOURS

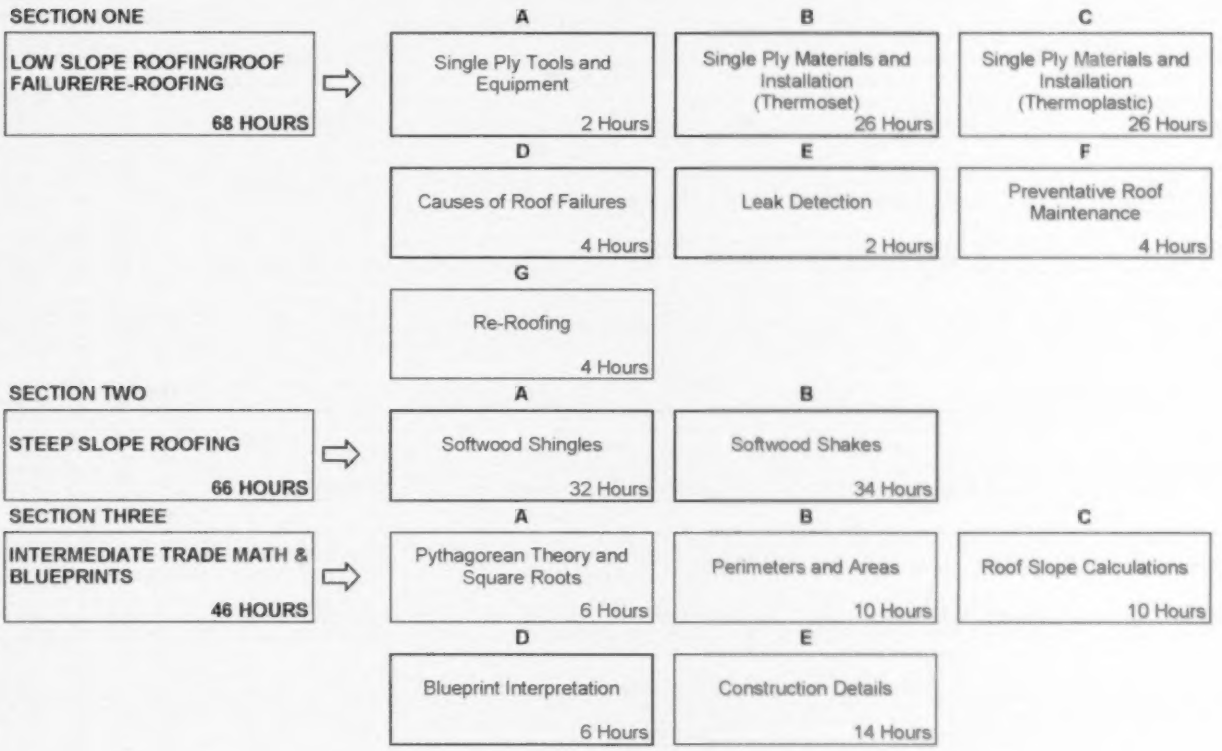
A	B
Asphalt Shingles 44 Hours	Residential Roof Structures 4 Hours

SECTION FOUR

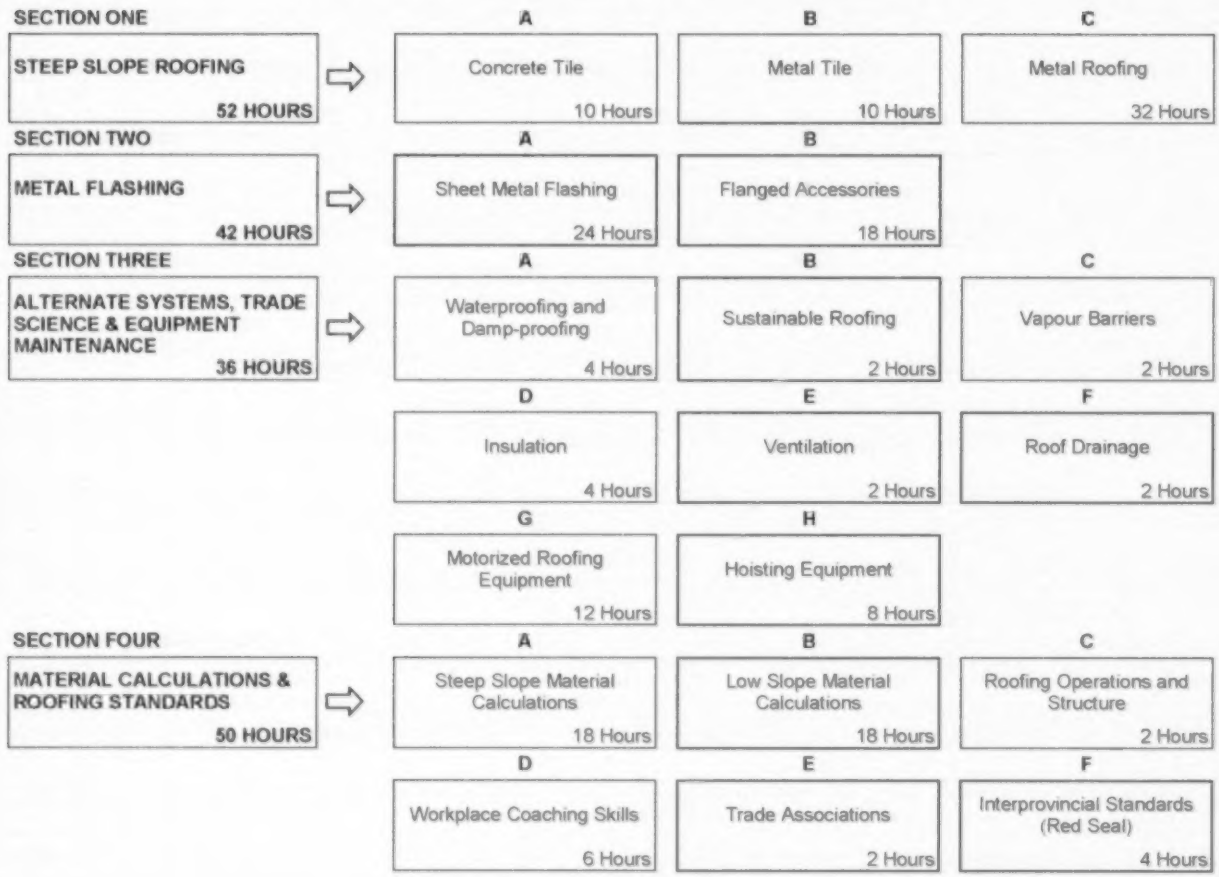
BASIC MATH & BLUEPRINT READING/ORTHOGRAPHIC DRAWINGS
44 HOURS

A	B	C
Calculate Using Whole Numbers 4 Hours	Calculate Using Decimals 4 Hours	Calculate Using Fractions 4 Hours
D	**E**	**F**
Ratios, Proportions and Percentages 12 Hours	Utilizing Blueprints 4 Hours	Types of Drawing Views 6 Hours
G		
Interpreting Symbols and Abbreviations 10 Hours		

SECOND PERIOD
(6 Weeks 30 Hours Per Week – Total of 180 Hours)



THIRD PERIOD
(6 Weeks 30 Hours Per Week – Total of 180 Hours)



NOTE: The hours stated are for guidance and should be adhered to as closely as possible. However, adjustments must be made for rate of apprentice learning, statutory holidays, registration and examinations for the training establishment and Apprenticeship and Industry Training.

FIRST PERIOD TECHNICAL TRAINING
ROOFER TRADE
COURSE OUTLINE

UPON SUCCESSFUL COMPLETION OF THIS PROGRAM THE APPRENTICE SHOULD BE ABLE TO PERFORM THE FOLLOWING OUTCOMES AND OBJECTIVES.

SECTION ONE: ..... STANDARD WORKPLACE SAFETY ..... 28 HOURS

A. Safety Legislation, Regulations & Industry Policy in the Trades ..... 2 Hours

Outcome: ***Describe legislation, regulations and practices intended to ensure a safe work place in this trade.***

1. Demonstrate the ability to apply the Occupational Health and Safety Act, Regulation and Code.
2. Explain the role of the employer and employee in regard to Occupational Health and Safety (OH&S) regulations, Worksite Hazardous Materials Information Systems (WHMIS), fire regulations, Workers Compensation Board regulations, and related advisory bodies and agencies.
3. Explain industry practices for hazard assessment and control procedures.
4. Describe the responsibilities of workers and employers to apply emergency procedures.
5. Describe positive tradesperson attitudes with respect to housekeeping, personal protective equipment and emergency procedures.
6. Describe the roles and responsibilities of employers and employees with respect to the selection and use of personal protective equipment (PPE).
7. Select, use and maintain appropriate PPE for worksite applications.

B. Climbing, Lifting, Rigging and Hoisting ..... 2 Hours

Outcome: ***Describe the use of personal protective equipment (PPE) and safe practices for climbing, lifting, rigging and hoisting in this trade.***

1. Select, use and maintain specialized PPE for climbing, lifting and load moving equipment.
2. Describe manual lifting procedures using correct body mechanics.
3. Describe rigging hardware and the safety factor associated with each item.
4. Select the correct equipment for rigging typical loads.
5. Describe hoisting and load moving procedures.

C. Hazardous Materials & Fire Protection ..... 3 Hours

Outcome: ***Describe the safety practices for hazardous materials and fire protection in this trade.***

1. Describe the roles, responsibilities features and practices related to the workplace hazardous materials information system (WHMIS) program.
2. Describe the three key elements of WHMIS.
3. Describe handling, storing and transporting procedures when dealing with hazardous material.
4. Describe safe venting procedures when working with hazardous materials.
5. Describe fire hazards, classes, procedures and equipment related to fire protection.

D. Apprenticeship System Orientation ..... 2 Hours

Outcome: ***Explain the role and purpose of the advisory network and Provincial Apprenticeship Committee (PAC) structure for the Roofer trade.***

1. Describe the structure and purpose of local and provincial apprenticeship committees.
2. State the process involving the Contract of Apprenticeship and Record Book.
3. Outline the Training Profile for the roofer trade.
4. Be aware of the need for compliance with the Apprenticeship Act and Regulations.

E. Safe Roofing Practices and Regulations ..... 2 Hours

Outcome: ***Apply trade related Occupational Health and Safety regulations and safe work practices in the workplace.***

1. Describe the procedures for obtaining first aid training.
2. Identify Occupational Health and Safety regulations most pertinent to the roofing industry.
3. Discuss fall protection as related to the roofing industry.
4. Describe the potential injuries that could result from roofing work site hazards, such as:
   a) strains and sprains
   b) lacerations
   c) heat exhaustion
   d) sun stroke
   e) frost bite
   f) burns.
5. Discuss safe work practices related to roofing construction sites and public safety.

F. Commercial / Industrial Roof Structures ..... 4 Hours

Outcome: ***Describe commercial and industrial type roof structures.***

1. Define construction features found on commercial and industrial buildings in relation to terminology.
2. Identify various types of roof styles and shapes in low slope designs.

G. Roof Deck Materials ..... 2 Hours

Outcome: ***Identify the types of materials used for roof decks.***

1. Describe the types of roof deck materials, such as:
   a) wood
   b) concrete
   c) steel
   d) stramit.

H. Roof Deck Loading Procedures ..... 2 Hours

Outcome: ***Describe the various preparation and loading techniques used for roof decks.***

1. Identify procedures used to conduct a visual deck assessment prior to a new roof application for:
   a) wood decks
   b) steel decks
   c) concrete decks.
2. Describe deck preparation techniques prior to a roof replacement application for:
   a) wood decks
   b) steel decks
   c) concrete decks
   d) structural stramit.
3. Explain the procedures for loading materials and equipment onto a roof deck.
4. Identify the strong and weak areas of a roof deck in relation to roof loading.
5. Demonstrate the securing and protection of materials loaded onto a roof deck.

I. Hand and Power Tools ..... 2 Hours

Outcome: ***Demonstrate the ability to use and maintain roofing hand and power tools.***

1. Demonstrate the ability to select and use various roofing hand tools for specific jobs.
2. Demonstrate the maintenance and storage of various roofing hand tools.
3. Demonstrate the ability to select and use various roofing power tools for specific jobs.
4. Demonstrate the maintenance and storage of various roofing power tools.

J. Hoisting Equipment for Roofing ..... 3 Hours

Outcome: ***Identify and demonstrate the use of hoisting equipment pertinent to the roofing industry.***

1. Define the regulations required for hoisting and hoisting equipment as dictated by Alberta Workplace Health and Safety.
2. Describe the various types of hoisting equipment used in roofing.
3. Demonstrate hand signals used for hoisting.
4. Demonstrate proficiency in the assembly and disassembly of roof hoists.
5. Demonstrate the ability to work with ropes (knots and splices).

K. Roofing Equipment ..... 2 Hours

Outcome: ***Outline the use and maintenance of on-deck roofing equipment.***

1. Identify the types of on-deck roofing equipment and the safety requirements of each.
2. Describe the procedures used to operate various types of on-deck roofing equipment.
3. Explain the maintenance and storage of on-deck roofing equipment.

L. Truck Loading Procedures ..... 2 Hours

Outcome: ***List the procedures for loading materials and equipment onto a truck.***

1. Describe the sequence and distribution for loading materials onto a truck.
2. Define the process for securing materials onto a truck.
3. Describe the sequence and weight distribution for loading equipment onto a truck.
4. Define the process for securing equipment onto a truck.

SECTION TWO: ..... LOW SLOPE ROOFING ..... 60 HOURS

A. Torch Safety ..... 6 Hours

Outcome: ***Identify and demonstrate torch safety standards and practices as they pertain to the roofing industry.***

1. Perform roof top site hazard assessments.
2. Describe "Torch Safety" practices including "Fire Risk Management".
3. Demonstrate the set-up and operation of LP gas torches.
4. Perform fire watch techniques and recording.

B. Kettles and Burners ..... 4 Hours

Outcome: ***Demonstrate the start up, use and shut down of asphalt melting equipment.***

1. Describe the use of asphalt melting equipment and asphalt pumps.
2. Demonstrate the process used for the start-up of kettle operations.
3. List the procedures for handling and using "hot" products.
4. Demonstrate the process used to shutdown asphalt melting equipment.

C. Modified Bitumen ..... 34 Hours

Outcome: ***List and demonstrate the installation of various modified bitumen roof systems.***

1. List the various components of modified bitumen systems, such as:
   a) asphalts and adhesives
   b) vapour barriers
   c) insulations and cover boards
   d) base sheets
   e) cap sheets
   f) cold-process applications.
2. Demonstrate the installation techniques for various modified bitumen systems.
3. Discuss new materials as they become available.

D. BUR (Built Up Roofing) ..... 16 Hours

Outcome: ***Explain the installation of various BUR roof systems.***

1. Discuss the prevention of asphalt burns.
2. List the various components of BUR systems, such as:
   a) asphalts and adhesives
   b) vapour barriers

c) insulations and cover boards
d) organic and glass felts
e) cold-process applications

3. Describe application methods for the installation of BUR roof systems.
4. Describe various membrane flashings for BUR systems.
5. Explain membrane protection requirements.
6. Discuss new materials as they become available.

SECTION THREE ..... STEEP SLOPE ROOFING ..... 48 HOURS

A. Asphalt Shingles ..... 44 Hours

Outcome: Describe the types of asphalt shingles and installation techniques.

1. Describe various components of an asphalt shingle system, such as:
   a) eave and valley components
   b) underlayment
   c) flashings.
2. Describe the equipment used in the application of asphalt shingles.
3. Demonstrate the application process for asphalt shingles.
4. Discuss new materials as they become available.

B. Residential Roof Structures ..... 4 Hours

Outcome: Describe residential type roof structures.

1. Describe construction features found on residential buildings in relation to terminology.
2. Identify various types of roof styles and shapes in steep slope designs.

SECTION FOUR ....BASIC MATH & BLUEPRINT READING/ORTHOGRAPHIC DRAWINGS ..... 44 HOURS

A. Calculate Using Whole Numbers ..... 4 Hours

Outcome: Solve mathematical problems using basic arithmetic.

1. Perform calculations using whole numbers.
2. Perform calculations using the metric system.
3. Perform calculations using the imperial system.

B. Calculate Using Decimals ..... 4 Hours

Outcome: Solve mathematical problems using decimal numbers.

1. Perform calculations using decimals.

C. Calculate Using Fractions ..... 4 Hours

Outcome: Solve mathematical problems using fractions.

1. Perform calculations using fractions.

D. Ratios, Proportions and Percentages ..... 12 Hours

Outcome: ***Solve mathematical problems using ratios, proportions and percentages.***

1. Perform calculations using percentages.
2. Perform calculations using ratios and proportions.

E. Utilizing Blueprints ..... 4 Hours

Outcome: ***Understand the role of blueprints in the construction industry.***

1. List the basic components of a set of working drawings.
2. Explain the relationship between blueprints and specifications.

F. Types of Drawing Views ..... 6 Hours

Outcome: ***Draw and interpret various drawing styles.***

1. Draw and interpret orthographic drawings.
2. Identify the various types of lines used in blueprints.

G. Interpret Symbols and Abbreviations ..... 10 Hours

Outcome: ***Identify the symbols and abbreviations used in blueprints.***

1. Identify symbols on a set of blueprints.
2. Decipher abbreviations on a set of blueprints.

SECOND PERIOD TECHNICAL TRAINING
ROOFER TRADE
COURSE OUTLINE

UPON SUCCESSFUL COMPLETION OF THIS PROGRAM THE APPRENTICE SHOULD BE ABLE TO PERFORM THE FOLLOWING OUTCOMES AND OBJECTIVES.

SECTION ONE:..... LOW SLOPE/ROOF FAILURES/RE-ROOFING ..... 68 HOURS

A. Single Ply Tools and Equipment.....2 Hours

Outcome: ***Identify roofing tools and equipment used for single ply applications.***

1. Identify the various tools and equipment used in low slope single ply roofing.
2. Describe the purpose and operation of various single ply tools and equipment.
3. Describe the maintenance and storage of single ply tools and equipment.

B. Single Ply Materials and Installation (Thermoset) .....26 Hours

Outcome: ***Identify the materials and demonstrate the installation processes for thermoset single ply roof systems.***

1. Describe and demonstrate the installation process of thermoset membranes.
   a) EPDM
2. Discuss new materials as they become available.

C. Single Ply Materials and Installation (Thermoplastic) .....26 Hours

Outcome: ***Identify the materials and demonstrate the installation processes for-thermoplastic single ply roof systems.***

1. Describe and demonstrate the installation process of thermoplastic membranes.
   a) PVC
   b) TPO
2. Discuss new materials as they become available.

D. Causes of Roof Failures .....4 Hours

Outcome: ***Describe the causes and effects of roof failures and the repair techniques used.***

1. Discuss examples of roof failures.
2. Explain various roof defects and deficiencies.
3. Describe methods used to repair roof defects and deficiencies.

E. Leak Detection .....2 Hours

Outcome: ***Identify detection processes and probable causes of roof leaks.***

1. Describe the process used to identify the source of a roof leak.
2. Explain condensation leaks.
3. Discuss potential sources of water ingress.

F. Preventative Roof Maintenance ..... 4 Hours

Outcome: ***Explain the importance of regular roof maintenance to address normal wear.***

1. Discuss various environmental conditions and their adverse affect on roofs.
2. Discuss the importance of preventative roof maintenance.
3. Discuss the elements of a roof evaluation.

G. Re-roofing ..... 4 Hours

Outcome: ***Explain the steps taken to perform a re-roof.***

1. Describe the demolition process to re-roof a building.
2. Describe the methods used to seal and maintain the integrity of a roof during re-roofing.
3. Describe the techniques used to cover open areas of roofs during sudden weather shifts.
4. Explain the potential safety issues specific to re-roofing projects.

SECTION TWO ..... STEEP SLOPE ROOFING ..... 66 HOURS

A. Softwood Shingles ..... 32 Hours

Outcome: ***Describe the types of softwood shingles and installation techniques.***

1. Identify the types and grades of softwood shingles.
2. Demonstrate the process used to remove existing roofing.
3. Describe installation techniques including underlayment and flashing requirements.
4. Demonstrate the method used to apply softwood shingles on steep roofs.

B. Softwood Shakes ..... 34 Hours

Outcome: ***Describe the types of softwood shakes and installation techniques.***

1. Identify the types and grades of softwood shakes.
2. Demonstrate the process used to remove existing roofing.
3. Describe installation techniques including underlayment and flashing requirements.
4. Demonstrate the method used to apply softwood shakes on steep roofs.
5. Discuss alternate products such as composite materials.

SECTION THREE ..... INTERMEDIATE TRADE MATH & BLUEPRINTS ..... 46 HOURS

A. Pythagorean Theory and Square Roots ..... 6 Hours

Outcome: ***Calculate trade related problems using the Pythagorean theory and square roots.***

1. Solve geometrical problems using the Pythagorean theory.
2. Solve geometrical problems using the square root formula.

B. Perimeters and Areas ..... 10 Hours

Outcome: ***Calculate trade related problems using perimeter and area for geometrical trade related problems.***

1. Perform calculations using perimeter formulas on geometric shapes.
2. Perform calculations using area formulas on geometric shapes.

C. Roof Slope Calculations ..... 10 Hours

Outcome: ***Calculate trade related problems for various roof slopes.***

1. Perform calculations to determine the roof slope of steep slope roofs.
2. Perform calculations to determine the roof slope of low slope roofs.

D. Blueprint Interpretation ..... 6 Hours

Outcome: ***Demonstrate the ability to collect roofing related information from blueprints.***

1. Demonstrate the ability to gather roofing information from working blueprints.
2. Demonstrate the ability to read and interpret specifications.

E. Construction Details ..... 14 Hours

Outcome: ***Demonstrate the ability to scale and draw various roofing details.***

1. Read scale rulers using imperial and metric dimensions.
2. Demonstrate the ability to scale drawings and details.
3. Demonstrate the ability to draft roofing details.

THIRD PERIOD TECHNICAL TRAINING
ROOFER TRADE
COURSE OUTLINE

UPON SUCCESSFUL COMPLETION OF THIS PROGRAM THE APPRENTICE SHOULD BE ABLE TO PERFORM THE FOLLOWING OUTCOMES AND OBJECTIVES.

SECTION ONE: ..... STEEP SLOPE ROOFING ..... 52 HOURS

A. Concrete Tile ..... 10 Hours

Outcome: Outline the types of concrete tile and the application procedures.

1. List the types of concrete tile.
2. Describe the application techniques and requirements for concrete tile.
3. Describe the tools and equipment used for installation.

B. Metal Tile ..... 10 Hours

Outcome: Outline the types of metal tile and the application procedures.

1. List the types of metal tile.
2. Describe the application techniques and requirements for metal tile.
3. Describe the tools and equipment used for installation.

C. Metal Roofing ..... 32 Hours

Outcome: Describe the types of metal roofing and demonstrate the installation techniques.

1. List the types of metal roofs.
2. Explain the application techniques and requirements for metal roofs.
3. Identify the use of tools and equipment for installation.
4. Demonstrate application techniques for various metal roof systems.

SECTION TWO: ..... METAL FLASHING ..... 42 HOURS

A. Sheet Metal Flashing ..... 24 Hours

Outcome: Demonstrate the ability to fabricate and install metal flashings.

1. Describe and operate metal flashing fabrication equipment.
2. Demonstrate the ability to layout and fabricate metal flashings.
3. Demonstrate the ability to install metal flashings.

B. Flanged Accessories ..... 18 Hours

Outcome: Demonstrate the fabrication of different types of flanged accessories.

1. List the various types of metals used for flanged accessories.
2. Demonstrate the ability to layout and fabricate flanged accessories.

SECTION THREE: ..... ALTERNATE SYSTEMS, TRADE SCIENCE & EQUIPMENT MAINTENANCE ..... 36 HOURS

A. Waterproofing and Damp-proofing ..... 4 Hours

Outcome: ***Describe the materials and methods used in waterproofing and damp-proofing.***

1. Define waterproofing and damp-proofing.
2. Discuss the types of materials used in waterproofing.
3. Discuss the types of materials used in damp-proofing.
4. Describe the application methods used in waterproofing and damp-proofing.
5. Outline the special safety requirements for working "below grade" or in a "confined space".

B. Sustainable Roofing ..... 2 Hours

Outcome: ***Identify the types of materials and methods used for sustainable roofing.***

1. Explain the construction of garden roof systems including the advantages and disadvantages.
2. Describe the components (layers and sequence) and the special structural requirements of a garden roof system.
3. Discuss the various rooftop photovoltaic systems.
4. Discuss roofing and the urban heat island effect including bright membranes, solar reflectivity and emissivity.

C. Vapour Barriers ..... 2 Hours

Outcome: ***Identify the different types and functions of air and vapour barriers.***

1. Discuss the importance of a vapour barrier.
2. Describe the differences between a vapour retarder, vapour barrier and an air barrier.
3. Discuss the types of vapour retarder, vapour barrier and air barrier materials.
4. Discuss compatibility and continuity with the various building envelope systems.

D. Insulation ..... 4 Hours

Outcome: ***Identify the different types and functions of roof insulations.***

1. Describe the chemical classifications of roof insulations.
2. Describe the advantages and disadvantages of various types of insulation.
3. Identify the "R" value of various insulations.
4. Describe the application methods for the installation of roof insulations.

E. Ventilation ..... 2 Hours

Outcome: ***Identify the different types and functions of ventilation systems.***

1. Describe the importance of ventilation for roof systems.
2. Describe the different types of ventilation systems.
3. Determine the correct amount of ventilation required for various roof systems.
4. Explain the differences in venting for low slope and steep slope roofs.

F. Roof Drainage ..... 2 Hours

Outcome: ***Identify the various types and functions of roof drainage systems.***

1. Explain the differences between interior and exterior drainage systems.
2. Describe the types of roof drainage systems.

G. Motorized Roofing Equipment ..... 12 Hours

Outcome: ***Describe and perform maintenance tasks for motorized roofing equipment.***

1. Perform required safety inspections.
2. Discuss routine on-deck maintenance
3. Describe troubleshooting methods used.
4. Demonstrate maintenance techniques used.
5. Describe and demonstrate techniques used to troubleshoot and maintain small engines.

H. Hoisting Equipment ..... 8 Hours

Outcome: ***Describe and perform maintenance tasks for hoisting equipment.***

1. Perform the required safety inspections.
2. Discuss routine on-deck maintenance.
3. Describe troubleshooting methods used.
4. Demonstrate maintenance techniques used.

SECTION FOUR: .....MATERIAL CALCULATIONS & ROOFING STANDARDS ..... 50 HOURS

A. Steep Slope Material Calculations ..... 18 Hours

Outcome: ***Calculate materials for various steep slope roof styles.***

1. Determine the types of materials required for steep slope roofs.
2. Calculate material amounts on steep slope roofs.
3. Calculate flashing amounts on steep slope roofs.

B. Low Slope Material Calculations ..... 18 Hours

Outcome: ***Calculate materials for various low slope roof styles.***

1. Determine the types of materials required for low slope roofs.
2. Calculate material amounts on low slope roofs.
3. Calculate flashing amounts on low slope roofs.

C. Roofing Operations and Structure ..... 2 Hours

Outcome: ***Understand the responsibilities of various members of a roofing crew.***

1. Describe the various members of a roofing crew; both direct and indirect.
2. Discuss effective and efficient use of materials and labour for a roofing crew.

D. Workplace Coaching Skills ..... 6 Hours

Outcome: ***Utilize best practices for on-the-job apprenticeship training.***

1. Understand the following coaching skills used for training apprentices:
   a) Identify the objective of training.
   b) Relate to previous experiences.
   c) Demonstrate the skill or procedure.
   d) Guide and analyze the practice attempts.
   e) Provide constructive feedback.
   f) Assess progress.

E. Trade Associations ..... 2 Hours

Outcome: ***Describe the minimum standards set by Roofer trade associations.***

1. Identify the need for minimum roofing standards as required by the Alberta Roofing Contractors Association (ARCA) and the Alberta Allied Roofing Association (AARA).
2. Outline the conditions of guarantee offered by the Alberta Roofing Contractors Association (ARCA) and the Canadian Roofing Contractors Association (CRCA).
3. Discuss the roles and responsibilities of roof consultants.

F. Interprovincial Standards (Red Seal) ..... 4 Hours

Outcome: ***Discuss Red Seal / Interprovincial Standards.***

1. Describe the National Occupational Analysis (NOA).
2. Describe the relationship between the NOA and Red Seal / Interprovincial examinations.
3. Discuss the roles of federal and provincial government in the development of Red Seal Standards.
4. Discuss the role of industry in the development of Red Seal Standards.
5. Explain the intent of the Red Seal examination as related to interprovincial mobility.
6. Describe sources of information on Red Seal Standards and examination information.

Apprenticeship and Industry Training

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